



API's 2015 Exploration and Production Winter Standards Meeting

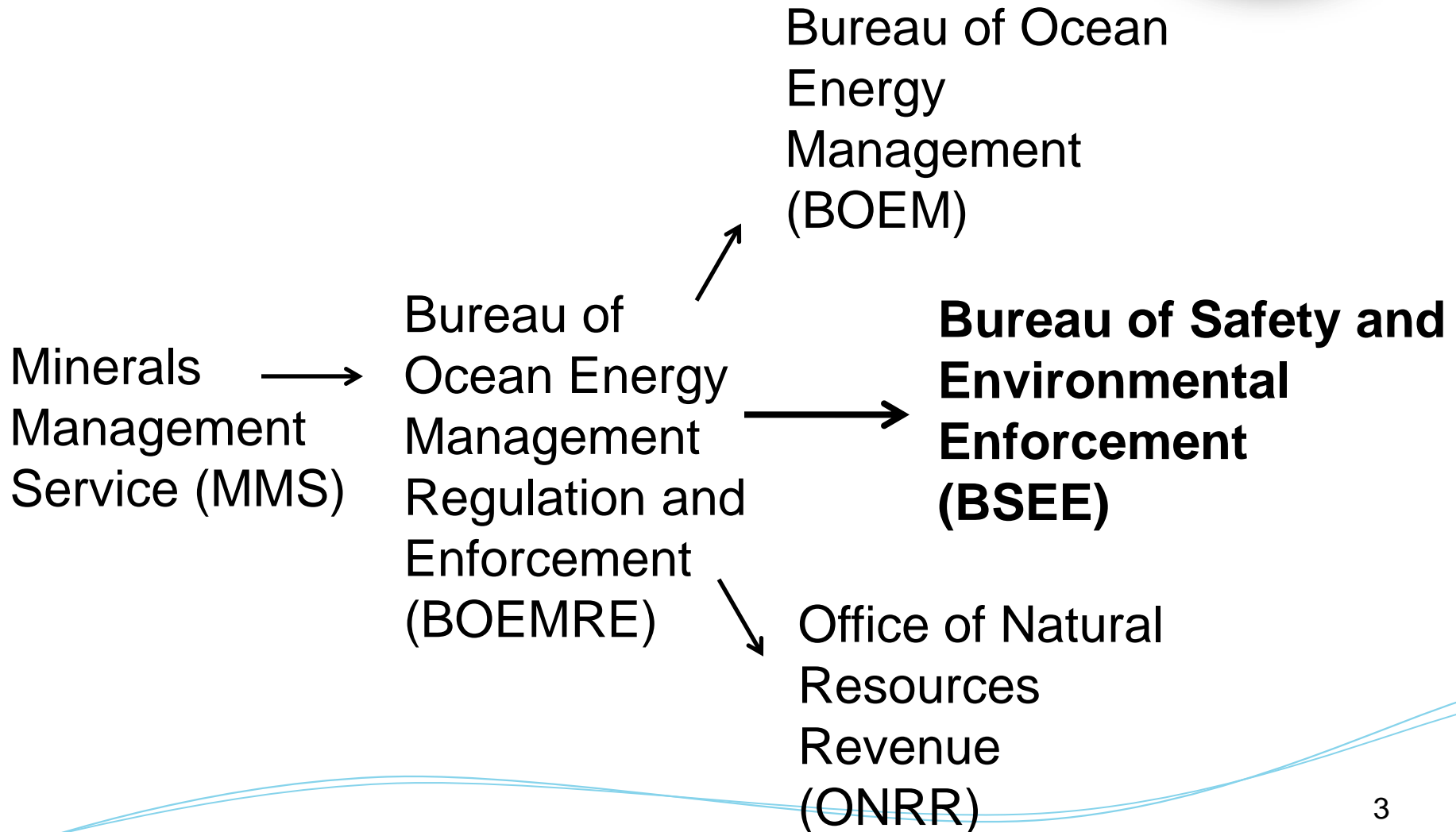
Emerging Technologies Branch Systems Reliability Section Evaluations

BSEE: Mission



To promote safety, protect the environment, and conserve resources offshore through vigorous regulatory oversight and enforcement.

BSEE: History



BSEE: Who We Are



- Staffing: 700 Employees
 - 200 engineers
 - 105 inspectors
- Locations
 - Headquartered in DC & Herndon, VA
 - Three regional offices
 - Gulf of Mexico – New Orleans, LA
 - Pacific – Camarillo, CA
 - Alaska – Anchorage, AK

New Regulatory Approaches



- A hybrid of performance and prescriptive requirements
- Life cycle approach toward critical equipment
- Third party certification
- Use of consensus standards as baseline

SRS – Purpose and Function



- Formed in February 2013
- Functions
 - Establish meaningful, on-going communication with original equipment manufacturer (OEM)
 - Conduct quality assurance (QA)/quality control (QC) evaluations on manufactured equipment
 - Evaluate “Fitness for Service” capabilities of equipment
 - Identify gaps in industry practices or standards
- SRS technical assessments evaluate issues that have potential industry wide impacts

SRS Evaluations To Date



• Four evaluations since February 2013

➤ Connector and Bolt Failures

- Completed August 2014

➤ Seal Assembly and Cement Failures

- Completed January 2015

➤ Two evaluations in progress

- Wing-valve Assembly
- HC Connector



Connector and Bolt Failures History



- December 2012
- During drilling operations, H4 Connector Bolts failed on LMRP
 - 432 barrels of synthetic-based mud released
- Initial evaluation identified a global concern affecting
 - ~ 10,982 replacement bolts
 - ~ 361 LMRP connectors

Connector and Bolt Failures Evaluation



- Initial Industry Findings
 - Root Cause – Hydrogen Induced Stress Corrosion Cracking
- Additional Concerns Identified by BSEE
 - Material Properties (Hardness, YS, UTS)
 - Coatings
 - QA/QC, Quality Management System (QMS)

Connector and Bolt Failures Evaluation



- Material Property Concerns
 - Inconsistencies across industry standards for material properties requirements related to fasteners (bolts/connectors)
 - Hardness, YS, UTS
- Standards with different material property requirements for subsea operation include:
 - API 6A; API 16A; API 16F; API 17A; NACE MR0175; NORSOK-M001
 - Fastener Coatings - ASTM B633; ASTM B849; ASTM B850; ASTM F1941; ASTM F1137

Connector and Bolt Failures Evaluation



• Coatings

- Per the OEM specification, subcontractor relied on the older 1998 edition of ASTM B633 standard, rather than the latest 2007 edition
- Bolts did not receive required post bake electroplating treatment per the latest 2007 edition

• Interpretation of ASTM B633

- Concerns between OEM and industry on the appropriate application for Service Class 2

• What is the appropriate material design selection and application for marine service?

Connector and Bolt Failures Evaluation



● QMS

- OEM's QMS qualified/audited only first-tier suppliers
 - OEM QMS did not require qualification and audit of second, third tier subcontractors
 - Neither operator nor contractor detected an issue with the sub-tier supplier during their assessment of the OEM
 - Need improved oversight of second and third tier subcontractors (Quality Standards)

Path Forward



- BSEE to work with industry on developing standards to address the following:
 - Consistent material property requirements for fasteners among standards
 - Material Properties (Hardness, YS, UTS)
 - Coatings
 - OEM QMS

Path Forward



- Two options available to BSEE to address issues on Connector/Bolt
 - Standards
 - Regulation

Follow-Up



- BSEE International Standards Workshop – May 2015
 - Friday, May 8, 2015 (OTC Week)
 - University of Houston Hilton
 - Four concurrent sessions on
 - Quality Management and Equipment Reliability
 - Cementing
 - Emergency Disconnects (Dynamic Positioning and BOP)
 - High Pressure High Temperature
- International Regulators Forum – October 2015



Comments or Questions?

Questions or Comments???



<http://www.bsee.gov/BSEE-Newsroom/BSEE-News-Briefs/2014/BSEE-Releases-Technical-Review-of-Connector-and-Bolt-Failures/>

Website: www.bsee.gov



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Bureau of Safety and
Environmental Enforcement

Candi.Hudson@bsee.gov